

Essential Newborn Care Utilization and Associated Factors in Ethiopia: A Systematic Review and Meta-Analysis

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Abstract

Background: Globally, newborn death accounted for 46% of under-five deaths and more than 80% of newborn deaths are the result of preventable and treatable conditions. Reports on the prevalence and associated factors of essential newborn care utilization are highly variable and inconsistent across Ethiopia. Therefore, this systematic review and meta-analysis aimed to estimate the pooled prevalence of essential newborn care utilization and associated factors in Ethiopia. Methods : The international databases include: MEDLINE/PubMed, EMBASE, Web of Sciences, Scopus, Google Scholar, Science Direct, Cochrane library and others were scientifically explored. We considered all primary studies reporting the prevalence of essential newborn care utilization and associated factors in Ethiopia. We retrieved all necessary data by using a standardized data extraction format spreadsheet. STATA 14 statistical software was used to analyze the data and Cochrane Q test statistics and I² test was used to assess the heterogeneity between the studies. Random effect model was employed. Results: The pooled estimate of essential newborn care utilization from 11 studies in Ethiopia was 48.768% (95% CI: 27.891, 69.645). Residence [OR = 2.50 (95% CI: 1.64, 3.88)], Postnatal care [OR=5.53, 95% CI = (3.02, 10.13)], counseling during pregnancy and delivery [OR=4.39, 95% CI = (2.99, 6.45)], antenatal care follows up (OR=6.84; 95% CI: 1.15, 4.70) and maternal educational status [OR = 1.63 (95% CI: 1.12, 2.37)] were identified as the associated factors of essential newborn care utilization. Conclusion: Based on the current study essential newborn care utilization in Ethiopia was significantly low as compared to the current global recommendation on essential newborn care utilization. Place of residence, Postnatal care, counseling during pregnancy and delivery, antenatal care follows up and maternal educational status were associated risk factors variables. Therefore, on the basis of the results, it is suggested that special attention should be given to attempts to ensure that education should focus on women during ante and postnatal follow-up, counseling during pregnancy and delivery, as well as rural and illiterate mothers. Finally, appropriate newborn services utilization at health facilities and raising mother's level of awareness about newborn care practices should be recommended.

Background

Globally, neonatal death accounts for about 44% of under-five mortality and Sub-Saharan Africa (SSA) has the highest rates of neonatal mortality [1]. Approximately 4 million newborn deaths occurred worldwide every year [2, 3]. It is estimated that 7.7 million children under the age of five die globally in a year, of whom about 3.1 million die in the neonatal period and 99% die in low- and middle-income countries [4-6]. Despite newborn death rates are also decreasing globally, low and middle-income countries are experiencing much slower rate declines as compare to developed regions [5]. Neonatal period contributes a greater proportion of the death rate of under-five. Given the progress in minimizing under-five mortality, newborn deaths have declined globally at a slower rate. [7]. About 120,000 newborns die each year in Ethiopia during the neonatal period which represents 42 % of all under-five mortality [8].

The use of essential newborn care based on the World Health Organization (WHO) can be described as a strategic approach designed to improve the health of newborns through interventions prior to conception,

during the time of pregnancy, during delivery and soon after birth and during the postnatal period [9]. Consequently, the WHO recommended essential Newborn Care (ENBC) practices to reduce the risk of major causes of neonatal deaths in both community and facility delivery [10]. According to WHO recommendation, ENBC procedures include drying and wrapping the newborn immediately after birth, encouraging skin-to-skin touch, dry cord care prompt breastfeeding and delayed bathing [11]. Many studies identified various risk factors that influence the essential newborn care services utilization which include; antenatal care visits, place of delivery, mother's level of education , counseling about ENBC, postnatal care visits, residence, , household wealth index, partner's educational level [12-14].

Contradictory studies have been conducted in Ethiopia to determine the use of appropriate newborn care and related factors. The burden is still higher and there is plenty of uncertainty and inconsistency across regions related to the use of appropriate newborn care and its associated factors. It is therefore important to determine the pooled prevalence of essential use of newborn care and its related factors at national level and to provide a pooled estimate. The findings of this study will be used to inform, plan, implement and evaluate health promotion policies and strategies for policymakers and program planners working in the area. The study will also provide basic information for future researchers.

Methods

Searching strategies

The aim of this study was to determine the combined prevalence and related factors of the use of essential newborn care in Ethiopia. We checked databases in this analysis without restricting the date of publishing and designing the report. The Recommended Reporting Items of the Systematic Reviews and Meta-Analysis Protocol (PRISMA-P) guidelines have been used to validate scientific accuracy [15]. The international databases include MEDLINE/PubMed, EMBASE, Web of Sciences, Scopus, and Grey literature databases, Google Scholar, Science Direct and Cochrane library were scientifically explored.

Additionally, to obtain additional articles, we checked reference lists of established studies. Unpublished studies were retrieved from the official websites of international and local organizations and universities. Keywords, medical subject headings (MeSH) terms were used to conduct the search. We used the search terms independently and/or in combination using "OR", "AND" or "NOT". Keywords/search terms were "Prevalence" OR "Epidemiology" AND "essential" AND/OR "essential newborn care" OR "essential newborn" AND/OR "essential newborn care" AND/OR "essential newborn care" AND "utilization" AND/OR "services" AND "factors" AND/OR "associated factors" AND/OR "risk factors" AND/OR "determinants" AND/OR "predictors" AND "Ethiopia". All articles were conducted from August 30, 2019, up to September 30, 2019, and all accessible studies up to September 30, 2019, were incorporated in our meta-analysis and systematic review.

Identification and selection of studies:

This meta-analysis and systematic review included the studies that were conducted in both institution and community-based studies that reported the essential newborn care utilization and associated factors in Ethiopia. This review included all articles published in peer-reviewed journals, that were written in English and Studies comprised of any published articles that assess associated factors affecting essential newborn care utilization in Ethiopia. We excluded the primary studies, inaccessible of full-text article after contact the primary author two times through email and in case of our outcome of interest did no reported. All studies that reported the prevalence of essential newborn care services utilization and its determinants in Ethiopia were included.

Data extraction and synthesis

Data were retrieved by two independent reviewers by using a standardized data extraction spreadsheet format. The data abstraction format includes author, the study year, region of study setting (region and rural or urban), study design, sample size, prevalence, and associated factors. Any disagreements during the extraction process were solved by consensus between the reviewers. If we got incomplete data, we excluded the study after two attempts were made to contact the corresponding author by email. Also, the two authors performed the quality assessment of studies independently. Any discrepancy was resolved by discussion and agreement.

Quality Assessment of the Studies and risk of bias assessment

To assess the quality of each study, we applied Newcastle-Ottawa quality assessment tool scale adopted for cross-sectional studies [16]. The modified Newcastle – Ottawa scales consists of three sections. The first section tool is rated from five stars for methodological evaluation. The second section tool is ranked from three stars for comparability assessment. The third section tool is evaluated from two points that deal with the statistical analysis and the outcome of each study. The original study was assessed by two reviewers independently and any disagreement between the reviewers was solved by taking the mean score of the two reviewers. Finally, the original studies with the scale of ≥ 6 out of 10 were considered as high quality after reviewing different literature.

Data synthesis and statistical analysis

For farther analysis, we imported the data to STATA version 14.0 statistical software after extracting the data using Microsoft Excel format. Using the binomial distribution formula, Standard error was calculated for each study. We identify the heterogeneity between the studies using Cochrane's Q statistics (Chi-square), inverse variance (I^2) and p-values [17]. The statistical output showed that there was significant heterogeneity among the studies ($I^2 = 99.8\%$, $p = 0.000$) so that we used a random-effects meta-analysis model to estimate the pooled prevalence and associated factors of essential newborn care utilization in Ethiopia. Also, we used a forest plot to detect the presence of heterogeneity. Furthermore, subgroup analysis and meta-regression were used to identify the possible source of heterogeneity. The evidence of publication bias was checked using funnel plot symmetry. Besides, the statistical significance of publication bias was assessed using both Egger's and Beggar's test, subsequently, a trim-and-fill analysis

was performed, with the p-value, less than 5% was used to declare the presence of publication bias [18, 19].

Results

Study selection and data extraction

A total of 434 studies were identified using electronic searches (through Database searching ($n = 426$) and other sources ($n = 8$)) that was conducted from August 30, 2019, up to September 30, 2019. Of these, 238 studies were excluded due to duplication. From the remaining 196 studies, after reviewing the title and abstract 180 studies were excluded as they were irrelevant for this systematic review and meta-analysis. The remaining 16 full-text articles were assessed for eligibility criteria based on the pre-defined criteria. Among these five articles were further excluded due to they are not inline to the preset criteria, three studies from Ethiopia [20-22], one study from Nepal [23] and one study from Himalayas [24].

Finally, 11 studies were fulfilled the eligibility criteria and included in this systematic review and meta-analysis (Fig.1).

Characteristics of the studies

A total of 5416 Study participants included in his systematic review with a range of 296 in Tigray [25] to 845 in Amhara [26] in individual studies, and studies were carried out from 2015 to 2019.

Utilization of Essential Newborn Care Services in Ethiopia

The utilization of essential newborn care services from included studies ranged between 23.1 % and 96.1 % (Table 1). As indicated in the forest plot, the pooled estimate for utilization of essential newborn care services from 11 studies in Ethiopia was 48.768% (95% CI: 27.891, 69.645) (Fig. 2). We identified a high and significant heterogeneity between studies ($I^2 = 99.8\%$; $p\text{-value}=0.000$), indicating great variability in utilization across studies, random effect analysis model was used to estimate the pooled prevalence of the utilization of essential newborn care service in Ethiopia (Fig. 2). We performed a subgroup analysis based on Study Area and study setting to identify the source of heterogeneity (Table 2). Beyond subgroup analysis, meta-regression for the included studies was conducted to identify factors for heterogeneity. However, there was no statistical significance value from the meta-regression (Table 3).

Publication bias

We observed publication bias using both Begg's and Egger's tests [18, 19] and these tests showed that there was statistical evidence of publication bias at a p-value less than 0.05 and the funnel plot was asymmetry. By considering publication bias trim and fill meta-analysis was done [27]. However, based on this analysis, the prevalence of essential newborn care utilization was 48.77 and no significant change was showed as compared with the main meta-analysis.

Sensitivity and Subgroup analysis

Due to considerable heterogeneity in this review, Subgroup analysis was done by setting of studies and regions. Based on Subgroup analysis report the pooled prevalence of essential Newborn care utilization was higher in Tigray region (66.93 %) followed by Amhara region (59.62 %). Subgroup analysis was also carried out based on the study setting, according to this analyses the prevalence rate of 51.41% and 36.82% were revealed from community Based and institution-based respectively (**Table 2**). A sensitivity analysis was done to identify outlier studies. According to the analysis, no influential studies were detected so that all of the studies were included in the final analysis.

Associated Factors of Newborn Care Service Utilization

A total of 11 studies were included for analysis of an associated factor of newborn care services utilization. We identified five main associated factors with the pooled odds ratio ranging from 1.63 to 6.84. These associated factors were a place of residence, Immediate PNC, counseling during delivery, ANC follows up and educational status of mothers. The analysis of 11 studies showed that counseling about ENBC practices was showed statistically significant association with ENBC practice of mothers as compared with those mothers who had not got counseling about ENBC practices during ANC and PNC follow up [OR=4.39, 95% CI: (2.99, 6.45] (Fig. 3a). Similarly, this study showed that living in urban was strongly associated with essential newborn care utilization [OR = 2.50 (95% CI: 1.64, 3.88)] (Fig. 3b). Furthermore, the PNC visit was showed statistically significant association with ENBC practice of mothers when compared with those who had not to go immediate PNC visits after delivery [OR=5.53, 95% CI: (3.02, 10.13] (Fig. 3c). Moreover, utilization of newborn care services showed statistically significant association with ENBC among mothers who had two or more ANC visits compared to mothers making none visits (OR=6.84; 95% CI: 1.15, 4.70) (Fig. 3d). Mothers who had formal educational status were 1.63 times more likely to practice essential newborn care as compared to those who had no formal education [OR = 1.63 (95% CI: 1.12, 2.37)] (Fig. 3e).

Discussion

This research is important for understanding current newborn care practices and factors that affect them in order to intervene to increase the satisfaction and use of maternal and neonatal health services by individuals, families and communities, and for policymakers to establish criteria for improving the quality of maternal and newborn care in health care facilities. In this meta-analysis, we extensively reviewed studies analyzing the use of ENC services within Ethiopia and related variables. This systematic review and meta-analysis was aimed at estimating the pooled prevalence of the use of ENC in Ethiopia and its predictors. The combined estimate from 11 studies in Ethiopia for the use of essential newborn care services was 48.768 %. This finding was lower than the studies done in Nepal 70.7% [28], Indian 66.70% [29]. The possible explanation for these difference could be the socio-economic difference between the study areas, socio-cultural variation, the study period and the study setting, sample size and target population. The other possible explanations may be due to maternal health services coverage may vary in different countries based on increased awareness and information about ENBC utilization.

Our study findings revealed that counseling about ENBC practices among mothers during and after pregnancy was showed statistically significant association with ENBC practice of mothers as compared with those mothers who had not got counseling about ENBC practices during ANC and PNC. This can be explained by the fact that mothers who received training on essential newborn care during ANC, delivery and PNC periods could better understand the importance of the practice of essential newborn care [30]. There may be other possible reasons community health workers (HEWs) could discuss and educate about ENBC during monthly meeting [31]. Thus, to support the utilization of health facilities for prevent and treat neonatal mortality and morbidity, prompt postnatal care (PNC) for the mother and the child is important.

In our study, those mothers whose educational status is primary and above are more likely to practice ENBC as compared with those mothers who are not able to read and write. This is inline the research done in Nepal in which educational status was one of the predictors of essential newborn care practice [28]. This might be related to the fact that educated mothers may have a better understanding of ENBC practices. Additionally, maternal knowledge of essential newborn care must start with an effective educational plan before the baby's birth[32].

Also, it has been identified that higher levels of parental education have a significant impact on the level of knowledge about newborn care. This is in line with reported from several countries including India and Nepal [33, 34].. Urban resident mothers have been strongly associated with the use of appropriate newborn care with a 2.50 likelihood compared to rural residents This study is in line with a study conducted in Sri Lanka [35]. This could be due to health service accessibility and good secondary knowledge to enhance urban mother's educational status compared to women in rural areas [12]. The current review of utilization of newborn care services showed a statistically significant association with ENBC among mothers who had two or more ANC visits compared to mothers making none visit. This finding was supported by the study conducted in Northern Ghana which suggested that mothers who initiated ANC visit were two times more likely to practiced essential newborn care practice as compared to mothers who have no ANC [13]. The possible justification could be mothers who attended ANC have the chance of getting information about the components and the importance of newborn care practice from health professionals. Additionally, ANC have found to be positively associated with Clean cord care practice and thermal care practice [33]. Furthermore, immediate PNC visit was showed a statistically significant association with ENBC practice of women in this study. The likelihood of practicing for those mothers who had visited during immediate PNC was high as compared to those who have not immediate PNC visits by the community health workers. This could be due to that health workers may advise on the ENB care during immediate PNC visits. The possible justification could be health extension workers and community health workers might give proper counseling about essential newborn care practice.

limitations

The results of this systematic review and meta-analysis had limitations: in this systematic review and meta-analysis, all articles considered were cross-sectional in nature. As a consequence, it is not possible

to establish temporal relations between factors and outcome variables. Most of the research included in this review had a small sample size that could influence the final estimate. Furthermore, since this meta-analysis included accessible research recorded from a small number of institutes in Ethiopia, the various areas in the nation may be under-represented.

Conclusion And Recommendation

Based on this systematic review and meta-analysis, essential newborn care utilization in Ethiopia was significantly low as compared to the current global recommendation on essential newborn care utilization. Place of residence, Postnatal care, counseling during pregnancy and delivery, antenatal care follows up and maternal educational status were the predictor variables. Therefore, on the basis of the results, it is suggested that special attention should be given to attempts to ensure that education should focus on women for ante and postnatal care follow-up, counseling during pregnancy and delivery, as well as rural and illiterate mothers. Utilization of essential newborn care practice can reduce newborn death by 80%. Hence, appropriate newborn services utilization and distribution of the resources should be ensured, to sustain the more vulnerable populations at health facilities and raising mother's level of awareness about newborn care practices and more emphasis should be given by concerned bodies.

Abbreviations

ANC: antenatal care; CI: Confidence interval; ENBC: essential newborn care; OR: odds ratio; PNC: Postnatal care; SSA: Sub-Saharan Africa; SNNP: South Nation Nationalities of People U5M: under five mortalities; WHO: world health organization

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable

Availability of data and material

The datasets analyzed during the current study are available from the corresponding author upon reasonable request.

Competing interests

We have confirmed that we have no competing interests.

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No funding was obtained for this study.

Authors' contributions

YM and TY: developed the study design and protocol, literature review, selection of studies, quality assessment, data extraction, statistical analysis, interpretation of the data and developing the initial drafts of the manuscript.

YM, FA and MD: Involved in statistical analysis and interpretation, quality assessment, prepared the final draft of the manuscript. All authors read and approved the final manuscript

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Tables

Table 1: Characteristics of 11 Studies Reporting the Essential Newborn Care Utilization and Its Associated Factors in Ethiopia, 2019

SN	Author and Year of Publication		Place setting	Study Design	Sample size	Prevalence (95% CI)	Quality Score
	Study Area						
1	Berhe et al., 2017 [2]	Tigray	Institution-based	Cross-sectional	423	26.700 (22.484, 30.916)	8
2	Genet et al., 2015 [19]	Amhara	Community Based	Cross-sectional	570	23.100 (19.640, 26.560)	9
3	Bizuneh W., 2017 [20]	Oromia	Institution Based	Cross-sectional	417	47.000 (42.210, 51.790)	7
4	Marsha et al., 2018 [21]	SNNPR	Community Based	Cross-sectional	630	38.400 (34.602, 42.198)	8
5	Chichiabellu et al., 2018 [13]	SNNPR	Community Based	Cross-sectional	450	24.000 (20.054, 27.946)	9
6	Yimam K et al., 2015 [22]	Benishangul Gumz	Community Based	Cross-sectional	539	40.600 (36.454, 44.746)	7
7	Berhea et al., 2018 [23]	Tigray	Community Based	Cross-sectional	456	81.100 (77.507, 84.693)	9
8	Amanuel N. 2018 [24]	SNNPR	Community Based	Cross-sectional	422	30.800 (26.395, 35.205)	9
9	Misgna et al., 2016 [25]	Tigray	Community Based	Cross-sectional	296	92.900 (89.974, 95.826)	8
10	Desalegn et al., 2019 [26]	Amhara	Community Based	Cross-sectional	845	96.100 (94.795, 97.405)	7
11	Anmut W, et al., 2017 [27]	SNNPR	Community Based	Cross-sectional	368	35.500 (30.611, 40.389)	9

Table 2: Subgroup Analysis Which Describes the Pooled Prevalence of Essential Newborn Care Utilization in Ethiopia, 2019.

Subgroup		Included Studies	Prevalence (95% CI)	Heterogeneity statistics	P value	I ² (%)	Tau-squared
Region	Tigray	3	66.925 (29.817, 104.033)	658.71	0.000	99.7%	1.1e+03
	Amhara	2	59.618 (-11.920, 131.157)	1496.90	0.000	99.9%	2.7e+03
	SNNPR	4	32.154 (25.586, 38.722)	28.95	0.000	89.6%	40.1705
Study setting	Institution-based	2		36.817 (16.923, 56.710)	38.88	0.000	97.4%
	community Based	9		51.414 (28.254, 74.574)	3919.17	0.000	99.8%

Table 3: Meta-Regression for The Included Studies to Identify the Source of Heterogeneity for The Essential Utilization of Newborn Care Service in Ethiopia, 2019.

Variables	Characteristics	Coefficient	P-value
Year	Publication year	5.779168	0.420
Sample size		.0388121	0.536
	Tigray	26.33038	0.472
Region	Amhara	19.05547	0.619
	Oromia	6.400002	0.884
	SNNP	-8.426123	0.808
	Benishangul Gumuz	Reference	Reference
Study setting	Institution-based	-14.58638	0.530
	Community-based	Reference	Reference

Figures

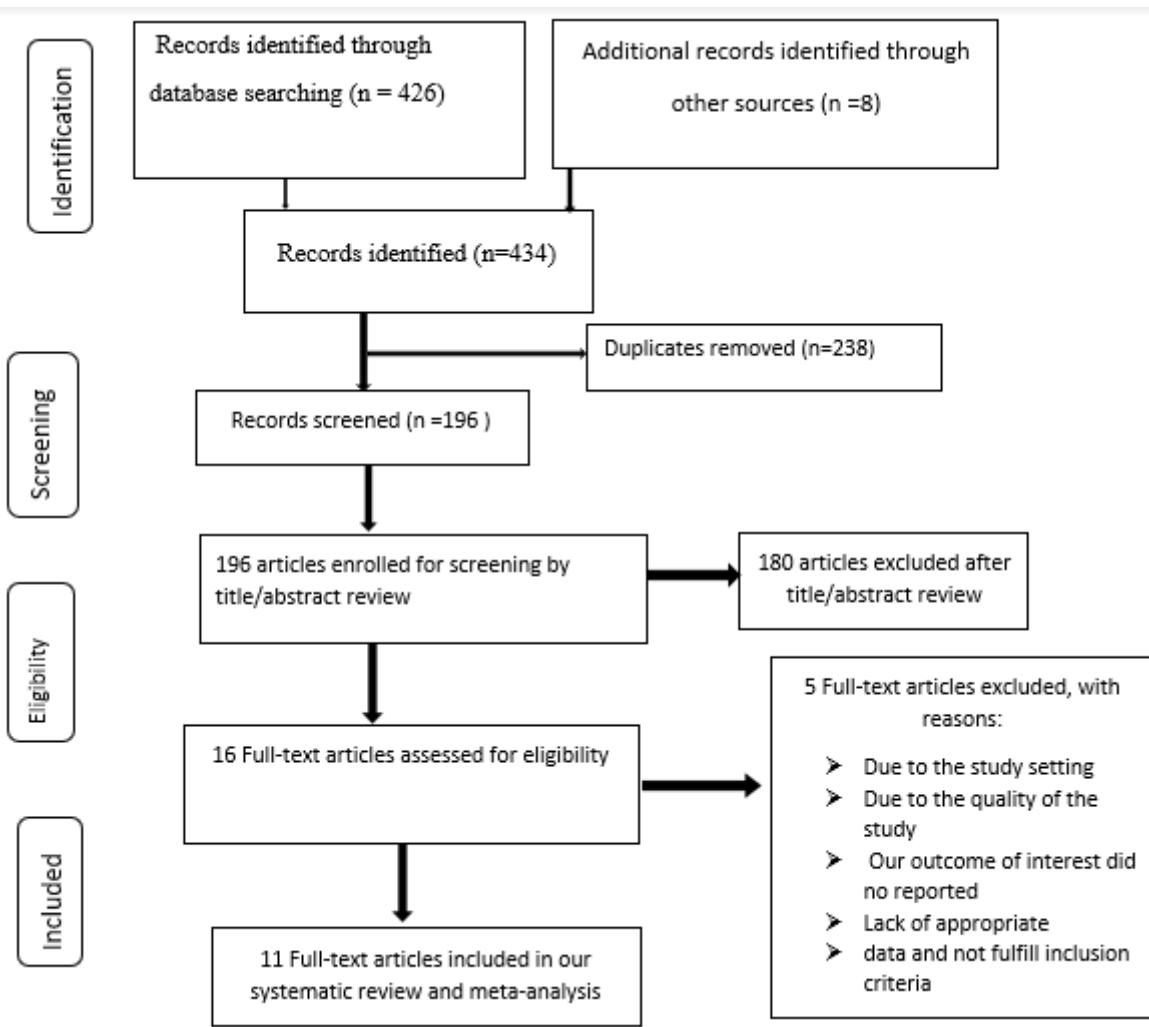


Figure 1

PRISMA Flow Diagram of Included Studies to Estimate the Pooled Prevalence and Associated Factors of Essential Newborn Care Utilization in Ethiopia, 2019.

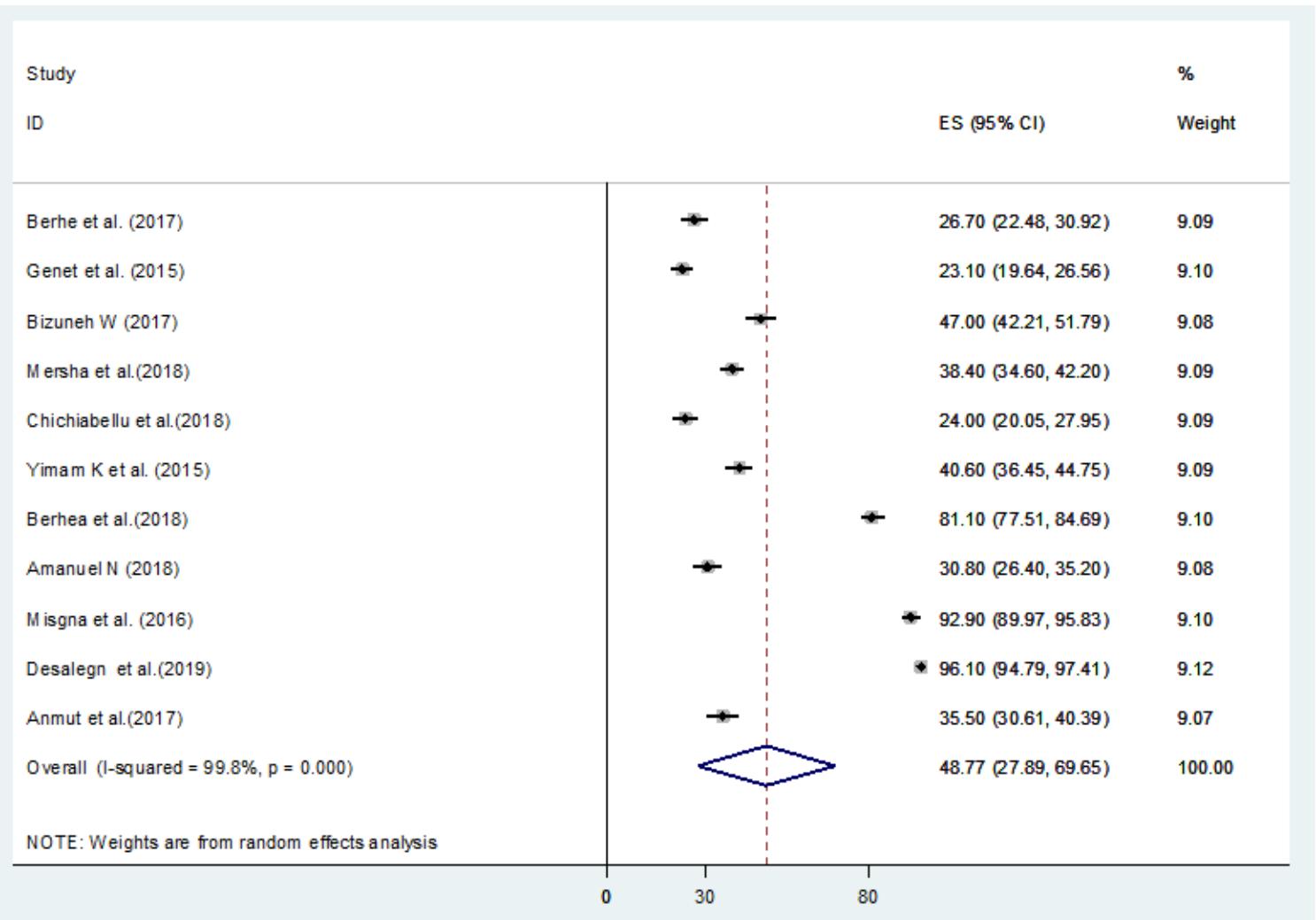


Figure 2

Forest Plot for The Prevalence of Essential Newborn Services Utilization in Ethiopia, 2019



Figure 3

Forest Plot Showing Pooled Odds Ratio of the Associated Factors for Essential Newborn Care Utilization.
 A) Counseling About ENC Practice During Delivery, B) Urban Residence, C) Postnatal Care, D) Antenatal Care, E) Maternal Educational Status